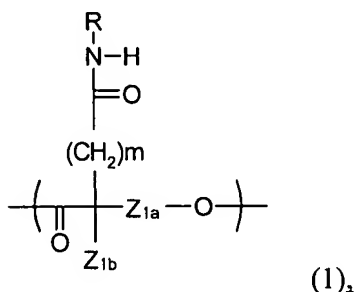


## B. Claims

The following is a complete listing of the claims, and replaces all earlier versions and listings.

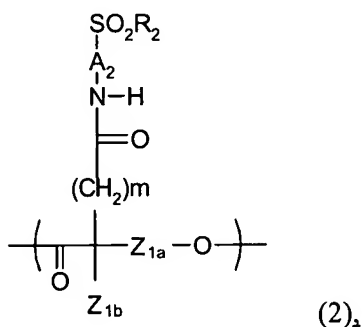
1. (Currently Amended) A polyhydroxyalkanoate comprising one or more units represented by the chemical formula (1) in a molecule;



wherein R represents  $-\text{A}_1-\text{SO}_2\text{R}_1$ ,  $\text{R}_1$  represents OH, a halogen atom, ONa, OK, or  $\text{OR}_{1a}$ ,  $\text{R}_{1a}$  and  $\text{A}_1$  each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure,  $\text{Z}_{1a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal ~~thereof~~ thereof,  $\text{Z}_{1b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group, which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and if more than one unit of the chemical formula (1) is present, each of ~~when multiple units exist,~~ R,  $\text{R}_1$ ,  $\text{R}_{1a}$ ,  $\text{A}_1$ ,

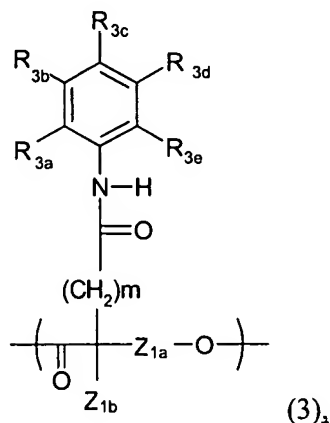
$Z_{1a}$ ,  $Z_{1b}$ , and  $m$  each ~~is~~ independently ~~have the above meanings~~ selected for each unit.

2. (Withdrawn-Currently Amended) ~~A~~ The polyhydroxyalkanoate according to claim 1, comprising one or more units each represented by ~~the~~ chemical formula (2), (3), (4A), or (4B) in a molecule as the one or more units each represented by the chemical formula (1):



wherein  $\text{R}_2$  represents OH, a halogen atom, ONa, OK, or  $\text{OR}_{2a}$ ,  $\text{R}_{2a}$  represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group,  $\text{A}_2$  represents a linear or branched alkylene group having 1 to 8 carbon atoms,  $\text{Z}_{1a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $\text{Z}_{1b}$  represents a hydrogen ~~atom~~, atom or a linear or branched alkyl group, aryl group, or aralkyl group, which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8,

and if more than one unit of the chemical formula (2) is present, each of ~~when multiple~~  
~~units exist,~~  $A_2$ ,  $R_2$ ,  $R_{2a}$ ,  $Z_{1a}$ ,  $Z_{1b}$ , and  $m$  ~~each is~~ independently ~~have the above~~  
~~meanings~~selected for each unit;<sub>i</sub>



wherein  $R_{3a}$ ,  $R_{3b}$ ,  $R_{3c}$ ,  $R_{3d}$ , and  $R_{3e}$  each independently represent  $SO_2R_{3f}$   
~~( $R_{3f}$  represents OH, a halogen atom, ONa, OK, or  $OR_{3ff}$  ( $R_{3ff}$  represents a linear or~~  
~~branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted~~  
~~phenyl group))~~, a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon  
atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an  $NH_2$  group, an  
 $NO_2$  group,  $COOR_{3g}$  ( ~~$R_{3g}$  represents an H atom, an Na atom, or a K atom~~), an  
acetamide group, an OPh group, an NHPh group, a  $CF_3$  group, a  $C_2F_5$  group, or a  $C_3F_7$   
group (~~Ph represents a phenyl group~~), and at least one of these groups represents  
 $SO_2R_{3f}$ ,  $Z_{3a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear  
alkylene chain has at least one linear or branched alkyl group, or at least one alkyl  
group containing a residue having any one of a phenyl structure, a thienyl structure, and

a cyclohexyl structure at a terminal thereof,  $Z_{3b}$  represents a hydrogen atom, atom or a linear or branched alkyl group, aryl group, or aralkyl group, which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8, and if more than one unit of the chemical formula (3) is present, each of ~~when multiple units exist,~~  $R_{3a}$ ,  $R_{3b}$ ,  $R_{3c}$ ,  $R_{3d}$ ,  $R_{3e}$ ,  $R_{3f}$ ,  $R_{3f1}$ ,  $R_{3g}$ ,  $Z_{1a}$ ,  $Z_{1b}$ , and  $m$  ~~each is~~ independently have the above meanings~~selected~~ for each unit,

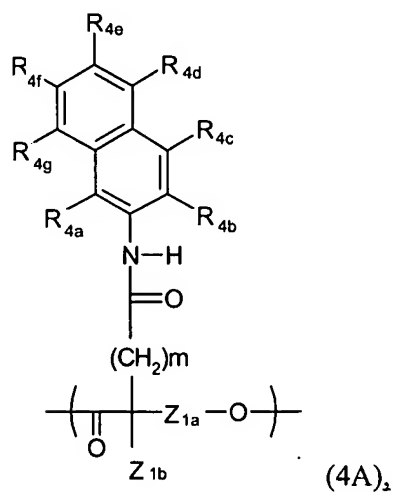
where:

$R_{3f}$  is OH, a halogen atom, ONa, OK, or  $OR_{3f1}$ ;

$R_{3f1}$  is a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group;

$R_{3g}$  is H, Na, or K; and

Ph is a phenyl group;



wherein  $R_{4a}$ ,  $R_{4b}$ ,  $R_{4c}$ ,  $R_{4d}$ ,  $R_{4e}$ ,  $R_{4f}$ , and  $R_{4g}$  each independently represent

SO<sub>2</sub>R<sub>4o</sub> (~~R<sub>4o</sub> represents OH, a halogen atom, ONa, OK, or OR<sub>4o1</sub> (R<sub>4o1</sub> represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group))~~), a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH<sub>2</sub> group, an NO<sub>2</sub> group, COOR<sub>4p</sub> (~~R<sub>4p</sub> represents an H atom, an Na atom, or a K atom~~), an acetamide group, an OPh group, an NHPPh group, a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, or a C<sub>3</sub>F<sub>7</sub> group (~~Ph represents a phenyl group~~), and at least one of these groups represents SO<sub>2</sub>R<sub>4o</sub>, Z<sub>1a</sub> represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z<sub>1b</sub> represents a hydrogen atom, atom or a linear or branched alkyl group, aryl group, or aralkyl group, which may be substituted by an aryl group, m represents an integer selected from 0 to 8, and if more than one unit of the chemical formula (4A) is present, each of ~~when multiple units exist,~~ R<sub>4a</sub>, R<sub>4b</sub>, R<sub>4c</sub>, R<sub>4d</sub>, R<sub>4e</sub>, R<sub>4f</sub>, R<sub>4g</sub>, R<sub>4o</sub>, R<sub>4o1</sub>, R<sub>4p</sub>, Z<sub>1a</sub>, and Z<sub>1b</sub>, and m ~~each is~~ independently have the above meanings selected for each unit,

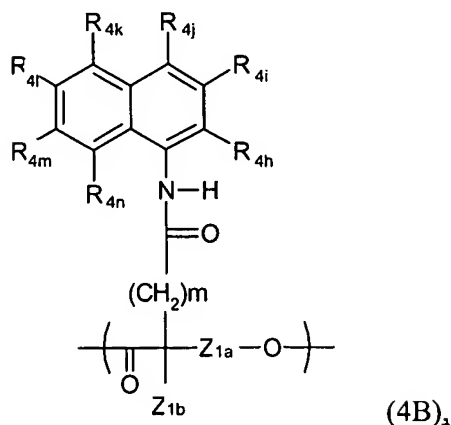
where:

R<sub>4o</sub> is OH, a halogen atom, ONa, OK, or OR<sub>4o1</sub>;

R<sub>4o1</sub> is a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group;

R<sub>4p</sub> is H, Na, or K; and

Ph is a phenyl group; and



wherein R<sub>4h</sub>, R<sub>4i</sub>, R<sub>4j</sub>, R<sub>4k</sub>, R<sub>4l</sub>, R<sub>4m</sub>, and R<sub>4n</sub> each independently represent SO<sub>2</sub>R<sub>4o</sub> (~~R<sub>4o</sub> represents OH, a halogen atom, ONa, OK, or OR<sub>4o1</sub> (R<sub>4o1</sub> represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group)~~), a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH<sub>2</sub> group, an NO<sub>2</sub> group, COOR<sub>4p</sub> (~~R<sub>4p</sub> represents an H atom, an Na atom, or a K atom~~), an acetamide group, an OPh group, an NHPPh group, a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, or a C<sub>3</sub>F<sub>7</sub> group (~~Ph represents a phenyl group~~), and at least one of these groups represents SO<sub>2</sub>R<sub>4o</sub>, m represents an integer selected from 0 to 8, Z<sub>1a</sub> represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a

terminal thereof,  $Z_{1b}$  represents a hydrogen atom, atom or a linear or branched alkyl group, aryl group, or aralkyl group, which may be substituted by an aryl group, and if more than one unit of the chemical formula (4B) is present, each of ~~when multiple units exist,~~  $R_{4h}$ ,  $R_{4i}$ ,  $R_{4j}$ ,  $R_{4k}$ ,  $R_{4l}$ ,  $R_{4m}$ ,  $R_{4n}$ ,  $R_{4o}$ ,  $R_{4ol}$ ,  $R_{4p}$ ,  $Z_{1a}$ ,  $Z_{1b}$ , and  $m$  ~~each is~~ independently ~~have the above meanings~~ selected for each unit,

where:

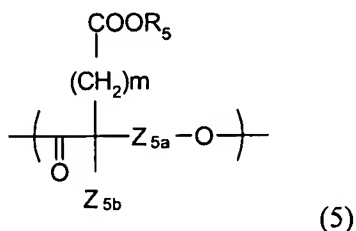
$R_{4o}$  is OH, a halogen atom, ONa, OK, or  $OR_{4ol}$ ;

$R_{4ol}$  is a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group;

$R_{4p}$  is H, Na, or K; and

Ph is a phenyl group.

3. (Withdrawn) A polyhydroxyalkanoate comprising one or more units represented by the chemical formula (5):

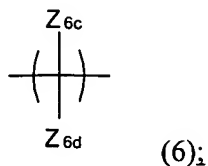


wherein  $R_5$  represents hydrogen, a group for forming a salt, or  $R_{5a}$ ,  $R_{5a}$  represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms, or a group having a saccharide,  $m$  represents an integer selected from 0 to 8,  $Z_{5a}$  represents a

linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{5b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist,  $R_5$ ,  $R_{5a}$ ,  $Z_{5a}$ ,  $Z_{5b}$ , and  $m$  each independently have the above meaning for each unit.

4. (Currently Amended) A ~~The~~ polyhydroxyalkanoate according to claim 1, wherein the linear alkylene chain structure represented by  $Z_{1a}$  in the chemical formula (1) is selected from the ~~following group consisting of~~ (A) to (D):

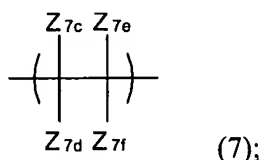
(A) when the linear alkylene chain has 1 carbon atom, in the linear alkylene chain structure represented by the chemical formula (6), one of  $Z_{6c}$  and  $Z_{6d}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, thereof:



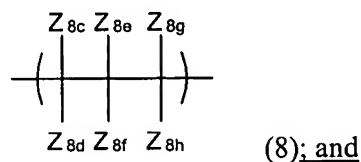
(B) when the linear alkylene chain has 2 carbon atoms, in the linear



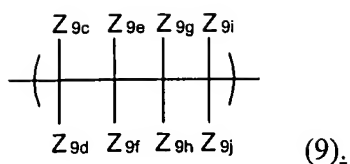
alkylene chain structure represented by the chemical formula (7), one of  $Z_{7c}$ ,  $Z_{7d}$ ,  $Z_{7e}$ , and  $R_{7f}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal ~~thereof~~,thereof:



(C) when the linear alkylene chain has 3 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (8), one of  $Z_{8c}$ ,  $Z_{8d}$ ,  $Z_{8e}$ ,  $Z_{8f}$ ,  $Z_{8g}$ , and  $Z_{8h}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal ~~thereof~~,thereof:

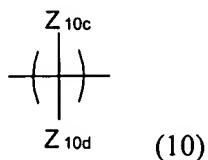


(D) when the linear alkylene chain has 4 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (9), one of  $Z_{9c}$ ,  $Z_{9d}$ ,  $Z_{9e}$ ,  $Z_{9f}$ ,  $Z_{9g}$ ,  $Z_{9h}$ ,  $Z_{9i}$ , and  $Z_{9j}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal ~~thereof~~,thereof:

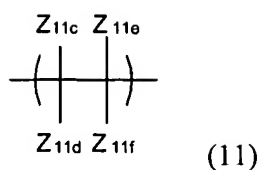


5. (Withdrawn) A polyhydroxyalkanoate according to claim 3, wherein the linear alkylene chain structure represented by  $Z_{5a}$  in the chemical formula (5) is selected from the following (A) to (D):

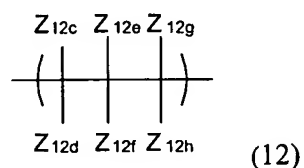
(A) when the linear alkylene chain has 1 carbon atom, in the linear alkylene chain structure represented by the chemical formula (10), one of  $Z_{10c}$  and  $Z_{10d}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



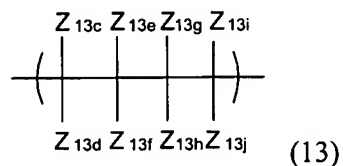
(B) when the linear alkylene chain has 2 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (11), one of  $Z_{11c}$ ,  $Z_{11d}$ ,  $Z_{11e}$ , and  $Z_{11f}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,



(C) when the linear alkylene chain has 3 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (12), one of  $\text{Z}_{12c}$ ,  $\text{Z}_{12d}$ ,  $\text{Z}_{12e}$ ,  $\text{Z}_{12f}$ ,  $\text{Z}_{12g}$ , and  $\text{Z}_{12h}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,

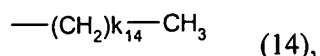


(D) when the linear alkylene chain has 4 carbon atoms, in the linear alkylene chain structure represented by the chemical formula (13), one of  $\text{Z}_{13c}$ ,  $\text{Z}_{13d}$ ,  $\text{Z}_{13e}$ ,  $\text{Z}_{13f}$ ,  $\text{Z}_{13g}$ ,  $\text{Z}_{13h}$ ,  $\text{Z}_{13i}$ , and  $\text{Z}_{13j}$  represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof.

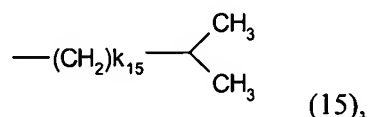


6. (Currently Amended) A-The polyhydroxyalkanoate according to

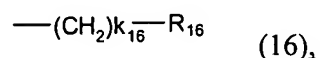
claim 4 or 5, wherein when a substituent selected from  $Z_{6c}$ ,  $Z_{6d}$ ,  $Z_{7c}$ ,  $Z_{7d}$ ,  $Z_{7e}$ ,  $Z_{7f}$ ,  $Z_{8c}$ ,  $Z_{8d}$ ,  $Z_{8e}$ ,  $Z_{8f}$ ,  $Z_{8g}$ ,  $Z_{8h}$ ,  $Z_{9c}$ ,  $Z_{9d}$ ,  $Z_{9e}$ ,  $Z_{9f}$ ,  $Z_{9g}$ ,  $Z_{9h}$ ,  $Z_{9i}$ ,  $Z_{9j}$ ,  $Z_{10c}$ ,  $Z_{10d}$ ,  $Z_{11e}$ ,  $Z_{11d}$ ,  $Z_{11e}$ ,  $Z_{11f}$ ,  $Z_{12c}$ ,  $Z_{12d}$ ,  $Z_{12e}$ ,  $Z_{12f}$ ,  $Z_{12g}$ ,  $Z_{12h}$ ,  $Z_{13c}$ ,  $Z_{13d}$ ,  $Z_{13e}$ ,  $Z_{13f}$ ,  $Z_{13g}$ ,  $Z_{13h}$ ,  $Z_{13i}$ , and  $Z_{13j}$  ~~described in~~ the chemical formulae (6), (7), (8), (9), (10), (11), (12), and (13) represents a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, the substituent is selected from ~~substituents represented by the~~ group consisting of chemical formulae (14), (15), (16), and (17):



wherein  $k_{14}$  represents an integer selected from 0 to 8, and ~~when multiple units exist~~ if more than one unit of the chemical formula (14) is present,  $k_{14}$  is,  $k_{14}$ 's each independently have the above meanings ~~selected for each unit, unit;~~

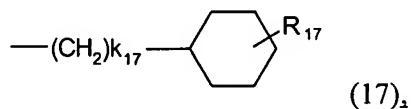


wherein  $k_{15}$  represents an integer selected from 0 to 7, and if more than one unit of the chemical formula (15) is present,  $k_{15}$  is ~~when multiple units exist,  $k_{15}$ 's each independently have the above meanings~~ selected for each unit, unit;



wherein  $k_{16}$  represents an integer selected from 1 to 8,  $R_{16}$  represents a substituent containing a residue having any one of a phenyl structure and a thienyl

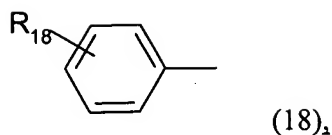
structure, and if more than one unit of the chemical formula (16) is present,  $k_{16}$  is when multiple units exist,  $k_{16}$  and  $R_{16}$  each independently have the above meaningsselected for each unit,unit; and



wherein  $R_{17}$  represents a substituent to a cyclohexyl group selected from an H atom, a CN group, an  $\text{NO}_2$  group, a halogen atom, a  $\text{CH}_3$  group, a  $\text{C}_2\text{H}_5$  group, a  $\text{C}_3\text{H}_7$  group, a  $\text{CF}_3$  group, a  $\text{C}_2\text{F}_5$  group, and a  $\text{C}_3\text{F}_7$  group,  $k_{17}$  represents an integer selected from 0 to 8, and if more than one unit of the chemical formula (17) is present, each of  $k_{17}$  and  $R_{17}$  is when multiple units exist,  $k_{17}$  and  $R_{17}$  each independently have the above meaningsselected for each unit.

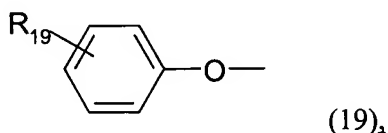
7. (Currently Amended) A-The polyhydroxyalkanoate according to claim 6, wherein  $R_{16}$  in the chemical formula (16), which is a residue having any one of a phenyl structure and a thienyl structure, is selected from the group consisting of residues represented by ~~the~~ chemical formulae (18), (19), (20), (21), (22), (23), (24), (25), (26), (27), and ~~(28)~~,(28):

the chemical formula (18) ~~below~~ representing ~~a group of an~~ unsubstituted or substituted phenyl ~~groups~~,group:



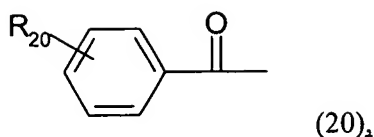
wherein R<sub>18</sub> represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO<sub>2</sub> group, a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a CH=CH<sub>2</sub> group, a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, a C<sub>3</sub>F<sub>7</sub> group, and COOR<sub>18a</sub> where R<sub>18a</sub> is H, Na, or K (~~R<sub>18a</sub> represents an H atom, an Na atom, or a K atom~~), a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, and a C<sub>3</sub>F<sub>7</sub> group, and when multiple units exist if more than one unit of the chemical formula (18) is present, R<sub>18</sub>'s may be different is independently selected for each unit,

the chemical formula (19) below representing ~~a group of an~~ unsubstituted or substituted phenoxy ~~groups,~~group:



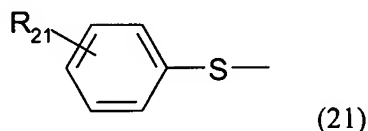
wherein R<sub>19</sub> represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO<sub>2</sub> group, a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a SCH<sub>3</sub> group, a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, and a C<sub>3</sub>F<sub>7</sub> group, and if more than one unit of the chemical formula (19) is present, R<sub>19</sub> is independently selected ~~when multiple units exist, R<sub>19</sub>'s may be different for each unit,~~

the chemical formula (20) below representing ~~a group of an~~ unsubstituted or substituted benzoyl ~~groups,~~group:



wherein R<sub>20</sub> represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO<sub>2</sub> group, a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a SCH<sub>3</sub> group, a CF<sub>3</sub> group, a C<sub>2</sub>F<sub>5</sub> group, and a C<sub>3</sub>F<sub>7</sub> group, and if more than one unit of the chemical formula (20) is present, R<sub>20</sub> is independently selected when multiple units exist, R<sub>20</sub>'s may be different for each unit, unit;

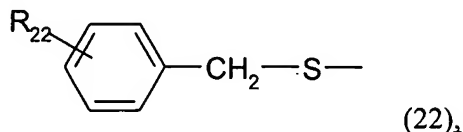
the chemical formula (21) ~~below~~-representing ~~a group of an~~ unsubstituted or substituted phenylsulfanyl ~~groups, group:~~



wherein R<sub>21</sub> represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO<sub>2</sub> group, ~~COOR<sub>21a</sub>, SO<sub>2</sub>R<sub>21b</sub> (R<sub>21a</sub> represents H, Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>21b</sub> represents OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>), a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a (CH<sub>3</sub>)<sub>2</sub>-CH group, and a (CH<sub>3</sub>)<sub>3</sub>-C group, COOR<sub>21a</sub>, and SO<sub>2</sub>R<sub>21b</sub>, where R<sub>21a</sub> is H, Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>21b</sub> is OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>, and if more than one unit of the chemical formula (21) is present, R<sub>21</sub> is independently selected when multiple units exist, R<sub>21</sub>'s may be different for each unit, unit;~~

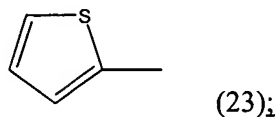
the chemical formula (22) ~~below~~-representing ~~a group of an~~ unsubstituted or

substituted (phenylmethyl)sulfanyl ~~groups,group:~~

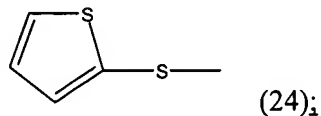


wherein R<sub>22</sub> represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an NO<sub>2</sub> group, ~~COOR<sub>22a</sub>, SO<sub>2</sub>R<sub>22b</sub> (R<sub>22a</sub> represents H, Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>22b</sub> represents OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>), a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a (CH<sub>3</sub>)<sub>2</sub>-CH group, and a (CH<sub>3</sub>)<sub>3</sub>-C group, COOR<sub>22a</sub>, and SO<sub>2</sub>R<sub>22b</sub>, where R<sub>22a</sub> is H, Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>22b</sub> is OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>, and if more than one unit of the chemical formula (22) is present, R<sub>22</sub> is independently selected when multiple units exist, R<sub>22</sub>'s may be different for each unit,unit;~~

the chemical formula (23) ~~below~~-representing a 2-thienyl ~~group,group:~~

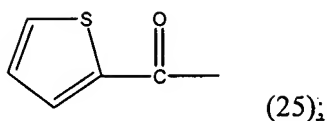


the chemical formula (24) ~~below~~-representing a 2-thienylsulfanyl ~~group,group:~~

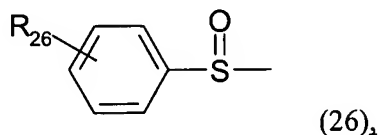


the chemical formula (25) ~~below~~-representing a 2-thienylcarbonyl ~~group,group:~~



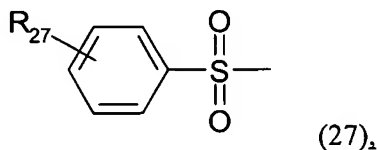


the chemical formula (26) ~~below~~-representing a ~~group of an~~ unsubstituted or substituted phenylsulfinyl ~~groups, group~~:



wherein  $R_{26}$  represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an  $\text{NO}_2$  group,  ~~$\text{COOR}_{26a}$ ,  $\text{SO}_2\text{R}_{26b}$~~  ( ~~$R_{26a}$  represents H, Na, K,  $\text{CH}_3$ , or  $\text{C}_2\text{H}_5$ , and  $R_{26b}$  represents OH, ONa, OK, a halogen atom,  $\text{OCH}_3$ , or  $\text{OC}_2\text{H}_5$~~ ), a  $\text{CH}_3$  group, a  $\text{C}_2\text{H}_5$  group, a  $\text{C}_3\text{H}_7$  group, a  $(\text{CH}_3)_2\text{-CH}$  group, and a  $(\text{CH}_3)_3\text{-C}$  group,  $\text{COOR}_{26a}$ , and  $\text{SO}_2\text{R}_{26b}$ , where  $R_{26a}$  is H, Na, K,  $\text{CH}_3$ , or  $\text{C}_2\text{H}_5$ , and  $R_{26b}$  is OH, ONa, OK, a halogen atom,  $\text{OCH}_3$ , or  $\text{OC}_2\text{H}_5$ , and if more than one unit of the chemical formula (26) is present,  $R_{26}$  is independently selected when multiple units exist,  $R_{26}$ 's may be different for each unit, unit;

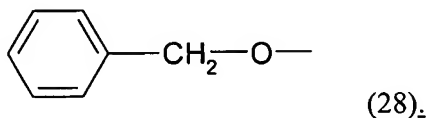
the chemical formula (27) ~~below~~-representing a ~~group of an~~ unsubstituted or substituted phenylsulfonyl ~~groups, group~~:



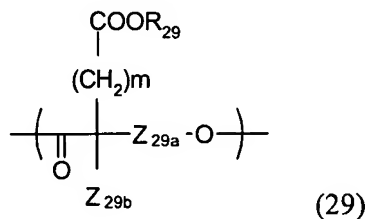
wherein  $R_{27}$  represents a substituent to an aromatic ring selected from an H atom, a halogen atom, a CN group, an  $\text{NO}_2$  group,  ~~$\text{COOR}_{27a}$ ,  $\text{SO}_2\text{R}_{27b}$~~  ( ~~$R_{27a}$  represents H,~~

Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>27b</sub> represents OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>, a CH<sub>3</sub> group, a C<sub>2</sub>H<sub>5</sub> group, a C<sub>3</sub>H<sub>7</sub> group, a (CH<sub>3</sub>)<sub>2</sub>-CH group, and a (CH<sub>3</sub>)<sub>3</sub>-C group, COOR<sub>27a</sub>, and SO<sub>2</sub>R<sub>27b</sub>, where R<sub>27a</sub> is H, Na, K, CH<sub>3</sub>, or C<sub>2</sub>H<sub>5</sub>, and R<sub>27b</sub> is OH, ONa, OK, a halogen atom, OCH<sub>3</sub>, or OC<sub>2</sub>H<sub>5</sub>, and if more than one unit of the chemical formula (27) is present, R<sub>27</sub> is independently selected when multiple units exist, R<sub>27</sub>'s may be different for each unit, unit;

the chemical formula (28) below representing a (phenylmethyl)oxy group, group:

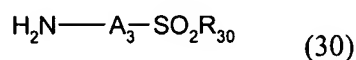


8. (Withdrawn) A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (1), comprising the step of subjecting a polyhydroxyalkanoate containing a unit represented by the chemical formula (29) and at least one kind of amine compound represented by the chemical formula (30) to a condensation reaction,

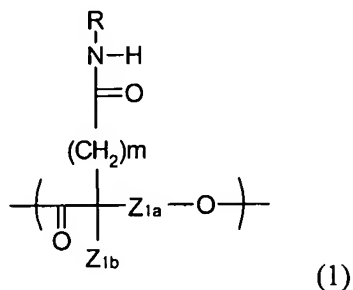


wherein R<sub>29</sub> represents hydrogen or a group for forming a salt, m represents

an integer selected from 0 to 8,  $Z_{29a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{29b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist,  $R_{29}$ ,  $Z_{29a}$ ,  $Z_{29b}$ , and  $m$  each independently have the above meaning for each unit,



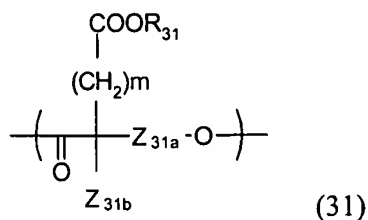
wherein  $R_{30}$  represents OH, a halogen atom, ONa, OK, or  $OR_{30a}$ ,  $R_{30a}$  and  $A_3$  are each independently selected from groups each having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, and when multiple units exist,  $R_{30}$ ,  $R_{30a}$ , and  $A_3$  each independently have the above meaning for each unit,



wherein  $R$  represents  $-A_1-SO_2R_1$ .  $R_1$  represents OH, a halogen atom, ONa, OK, or  $OR_{1a}$ ,  $R_{1a}$  and  $A_1$  each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or

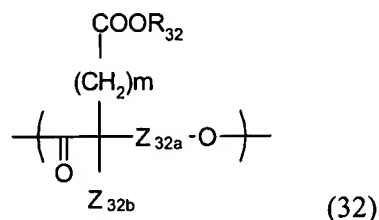
unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure,  $Z_{1a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{1b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8, and when multiple units exist,  $R$ ,  $R_1$ ,  $R_{1a}$ ,  $A_1$ ,  $Z_{1a}$ ,  $Z_{1b}$ , and  $m$  each independently have the above meaning for each unit.

9. (Withdrawn) A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (32), comprising the step of hydrolyzing a polyhydroxyalkanoate containing a unit represented by the chemical formula (31) in the presence of an acid or an alkali or the step of subjecting the polyhydroxyalkanoate to hydrogenolysis including catalytic reduction,



wherein  $R_{31}$  represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms,  $Z_{31a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the

linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{31b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8, and when multiple units exist,  $R_{31}$ ,  $Z_{31a}$ ,  $Z_{31b}$ , and  $m$  each independently have the above meaning for each unit,

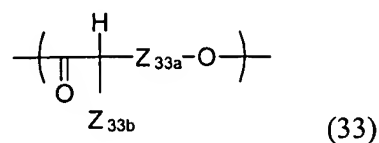


wherein  $R_{32}$  represents hydrogen or a group for forming a salt,  $Z_{32a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{32b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8, and when multiple units exist,  $R_{32}$ ,  $Z_{32a}$ ,  $Z_{32b}$ , and  $m$  each independently have the above meaning for each unit.

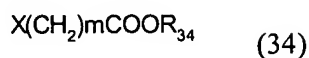
10. (Withdrawn) A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (35), comprising the steps of:

allowing a polyhydroxyalkanoate containing a unit represented by the chemical formula (33) to react with a base; and

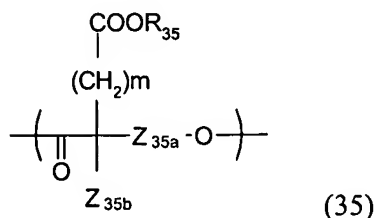
allowing the compound obtained in the foregoing step to react with a compound represented by the chemical formula (34),



wherein  $\text{Z}_{33\text{a}}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $\text{Z}_{33\text{b}}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist,  $\text{Z}_{33\text{a}}$  and  $\text{Z}_{33\text{b}}$  each independently have the above meaning for each unit,



wherein  $m$  represents an integer selected from 0 to 8,  $\text{X}$  represents a halogen atom, and  $\text{R}_{34}$  represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms,

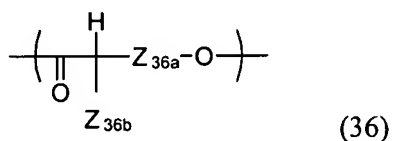


wherein  $R_{35}$  represents a linear or branched alkyl or aralkyl group having 1 to 12 carbon atoms,  $Z_{35a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{35b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group,  $m$  represents an integer selected from 0 to 8, and when multiple units exist,  $R_{35}$ ,  $Z_{35a}$ ,  $Z_{35b}$ , and  $m$  each independently have the above meaning for each unit.

11. (Withdrawn) A method of producing a polyhydroxyalkanoate containing a unit represented by the chemical formula (38), comprising the steps of:

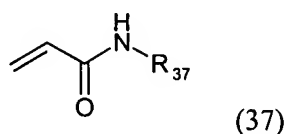
allowing a polyhydroxyalkanoate containing a unit represented by the chemical formula (36) to react with a base; and

allowing the compound obtained in the foregoing step to react with a compound represented by the chemical formula (37),

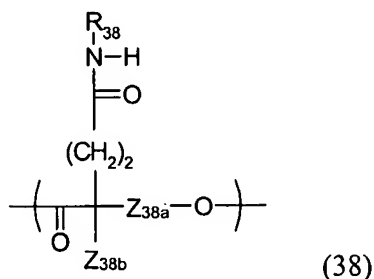


wherein  $Z_{36a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure,

and a cyclohexyl structure at a terminal thereof,  $Z_{36b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist,  $Z_{36a}$  and  $Z_{36b}$  each independently have the above meaning for each unit,



wherein  $R_{37}$  represents  $-\text{A}_{37}-\text{SO}_2\text{R}_{37a}$ .  $R_{37a}$  represents OH, a halogen atom, ONa, OK, or  $\text{OR}_{37b}$ ,  $R_{37b}$  and  $\text{A}_{37}$  are each independently selected from groups each having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic structure, and when multiple units exist,  $R_{37}$ ,  $R_{37a}$ ,  $R_{37b}$ , and  $\text{A}_{37}$  each independently have the above meaning for each unit,



wherein  $R_{38}$  represents  $-\text{A}_{38}-\text{SO}_2\text{R}_{38a}$ ,  $R_{38a}$  represents OH, a halogen atom, ONa, OK, or  $\text{OR}_{38b}$ ,  $R_{38b}$  and  $\text{A}_{38}$  each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or unsubstituted heterocyclic



structure,  $Z_{38a}$  represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain has at least one linear or branched alkyl group, or at least one alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof,  $Z_{38b}$  represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and when multiple units exist,  $R_{38}$ ,  $R_{38a}$ ,  $R_{38b}$ ,  $A_{38}$ ,  $Z_{38a}$ , and  $Z_{38b}$  each independently have the above meaning for each unit.